We claim:

1. A method to move an accessor within a data storage and retrieval system, comprising the steps of:

providing an accessor comprising a velocity control program, wherein said accessor is capable of traveling at a velocity V_{MAX} and accelerating at a maximum acceleration a_{MAX};

receiving a request to move said accessor a distance from a first location to a second location;

forming a first velocity profile wherein said accessor travels said distance in the minimum time interval, and wherein said first velocity profile requires a first maximum acceleration change;

calculating a second velocity profile, wherein said second velocity profile includes a second maximum acceleration change, wherein said second maximum acceleration change is less than said first maximum acceleration change;

determining if said accessor reaches a_{MAX} using said second velocity profile;

operative if said accessor does not reach a_{MAX} using said second velocity profile, loading said first velocity profile into said velocity control program;

operative if said accessor does reach a_{MAX} using said second velocity profile, loading said second velocity profile into said velocity control program;

moving said accessor using said velocity control program.

2. The method of claim 1, further comprising the steps of:

calculating a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX}, wherein said first velocity profile comprises said plurality of first velocity datapoints;

averaging two or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of first averaged velocity datapoints $v_{(i)avg}$;

forming said second velocity profile using said plurality of first averaged velocity datapoints $v_{(i)avg}$.

3. The method of claim 2, further comprising the step of calculating each of said plurality of first averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N))},$$

wherein N is greater than or equal to 1.

4. The method of claim 2, further comprising the step of calculating each of said plurality of averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 1.

5. The method of claim 1, further comprising the steps of:

forming a first acceleration profile using said first velocity profile;

calculating said second velocity profile by passing said first acceleration profile through a low pass Butterworth filter having a cutoff frequency greater than or equal to 15 hertz.

6. The method of claim 1, further comprising the steps of:

receiving a request to transport an object;

setting a threshold moment arm for said accessor;

calculating an actual moment arm for said accessor carrying said object;

determining if said actual moment arm exceeds said threshold moment arm;

operative if said actual moment arm exceeds said threshold moment arm, calculating a third velocity profile, wherein said third velocity profile includes a third maximum acceleration change, wherein said third maximum acceleration change is less than said second maximum acceleration change.

7. The method of claim 6, further comprising the steps of:

calculating a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX}, wherein said first velocity profile comprises said plurality of first velocity datapoints;

averaging three or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of second averaged velocity datapoints $v_{(i)avg}$;

forming said third velocity profile using said plurality of second averaged velocity datapoints $v_{(i)avg}$.

8. The method of claim 7, further comprising the step of calculating each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N)}),$$

wherein N is greater than or equal to 2.

9. The method of claim 7, further comprising the step of calculating each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 2.

10. The method of claim 6, further comprising the steps of:

forming a first acceleration profile using said first velocity profile;

calculating said third velocity profile by passing said first acceleration profile through a low pass nth order Butterworth filter having a cutoff frequency less than about 15 hertz, wherein n is greater than or equal to 3.

11. An article of manufacture comprising a computer useable medium having computer readable program code disposed therein for moving an accessor from a first location to a second location within a data storage and retrieval system, wherein said accessor comprises a velocity control program, and wherein said accessor is capable of traveling at a velocity V_{MAX} and accelerating at a maximum acceleration a_{MAX}, the computer readable program code comprising a series of computer readable program steps to effect:

receiving a request to move said accessor a distance from a first location to a second location;

forming a first velocity profile wherein said accessor travels said distance in the minimum time interval, and wherein said first velocity profile requires a first maximum acceleration change;

calculating a second velocity profile, wherein said second velocity profile includes a second maximum acceleration change, wherein said second maximum acceleration change is less than said first maximum acceleration change;

determining if said accessor reaches a_{MAX} using said second velocity profile;

operative if said accessor does not reach a_{MAX} using said second velocity profile, loading said first velocity profile into said velocity control program;

operative if said accessor does reach a_{MAX} using said first velocity profile, loading said second velocity profile into said velocity control program;

moving said accessor using said velocity control program.

12. The article of manufacture of claim 11, the computer readable program code comprising a series of computer readable program steps to effect:

calculating a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX}, wherein said first velocity profile comprises said plurality of first velocity datapoints;

averaging two or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of first averaged velocity datapoints $v_{(i)avg}$;

forming said second velocity profile using said plurality of first averaged velocity datapoints $v_{(i)avg}$.

13. The article of manufacture of claim 12, the computer readable program code comprising a series of computer readable program steps to effect calculating each of said plurality of first averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N))},$$

wherein N is greater than or equal to 1.

14. The article of manufacture of claim 12, the computer readable program code comprising a series of computer readable program steps to effect calculating each of said plurality of averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 1.

15. The article of manufacture of claim 11, the computer readable program code comprising a series of computer readable program steps to effect:

forming a first acceleration profile using said first velocity profile;

calculating said second velocity profile by passing said first acceleration profile through a low pass Butterworth filter having a cutoff frequency greater than or equal to about 15 hertz.

16. The article of manufacture of claim 11, the computer readable program code comprising a series of computer readable program steps to effect:

receiving a request to transport an object;

setting a threshold moment arm for said accessor;

calculating an actual moment arm for said accessor carrying said object;

determining if said actual moment arm exceeds said threshold moment arm;

operative if said actual moment arm exceeds said threshold moment arm, calculating a third velocity profile, wherein said third velocity profile includes a third maximum acceleration change, wherein said third maximum acceleration change is less than said second maximum acceleration change.

17. The article of manufacture of claim 16, the computer readable program code comprising a series of computer readable program steps to effect:

calculating a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX}, wherein said first velocity profile comprises said plurality of first velocity datapoints;

averaging three or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of second averaged velocity datapoints $v_{(i)avg}$;

forming said third velocity profile using said plurality of second averaged velocity datapoints $v_{(i)avg}$.

18. The article of manufacture of claim 17, the computer readable program code comprising a series of computer readable program steps to effect calculating each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N))},$$

wherein N is greater than or equal to 2.

19. The article of manufacture of claim 17, the computer readable program code comprising a series of computer readable program steps to effect calculating each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 2.

20. The article of manufacture of claim 16, the computer readable program code comprising a series of computer readable program steps to effect:

forming a first acceleration profile using said first velocity profile;

calculating said third velocity profile by passing said first acceleration profile through a low pass nth order Butterworth filter having a cutoff frequency less than about 15 hertz, wherein n is greater than or equal to 3

21. A computer program product usable with a programmable computer processor having computer readable program code embodied therein for moving an accessor from a first location to a second location within a data storage and retrieval system, wherein said accessor is capable of traveling at a velocity V_{MAX} and accelerating at a maximum acceleration a_{MAX}, comprising:

computer readable program code which causes said programmable computer processor to receive a request to move said accessor a distance from a first location to a second location;

computer readable program code which causes said programmable computer processor to form a first velocity profile wherein said accessor travels said distance in the minimum time interval, and wherein said first velocity profile requires a first maximum acceleration change;

calculate a second velocity profile, wherein said second velocity profile includes a second maximum acceleration change, wherein said second maximum acceleration change is less than said first maximum acceleration change;

computer readable program code which causes said programmable computer processor to determine if said accessor reaches a_{MAX} using said second velocity profile;

computer readable program code which, if said accessor does not reach a_{MAX} using said second velocity profile, causes said programmable computer processor to load said first velocity profile into said velocity control program;

computer readable program code which, if said accessor does reach a_{MAX} using said second velocity profile, causes said programmable computer processor to load said second velocity profile into said velocity control program; and

computer readable program code which causes said programmable computer processor to move said accessor using said velocity control program.

22. The computer program product of claim 21, further comprising:

computer readable program code which causes said programmable computer processor to calculate a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX};

computer readable program code which causes said programmable computer processor to average two or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of first averaged velocity datapoints $v_{(i)avg}$;

computer readable program code which causes said programmable computer processor to calculate said second velocity profile using said plurality of first averaged velocity datapoints $v_{(i)avg}$.

23. The computer program product of claim 22, further comprising computer readable program code which causes said programmable computer processor to calculate each of said plurality of first averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N)}),$$

wherein N is greater than or equal to 1.

24. The computer program product of claim 22, further comprising computer readable program code which causes said programmable computer processor to calculate each of said plurality of averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 1.

25. The computer program product of claim 21, further comprising:

computer readable program code which causes said programmable computer processor to form a first acceleration profile using said first velocity profile; and

computer readable program code which causes said programmable computer processor to calculate said second velocity profile by passing said first acceleration profile through a low pass Butterworth filter having a cutoff frequency greater than or equal to 15 hertz.

26. The computer program product of claim 21, further comprising:

computer readable program code which causes said programmable computer processor to receive a request to transport an object;

computer readable program code which causes said programmable computer processor to retrieve a predetermined threshold moment arm for said accessor;

computer readable program code which causes said programmable computer processor to calculating an actual moment arm for said accessor carrying said object;

computer readable program code which causes said programmable computer processor to determining if said actual moment arm exceeds said threshold moment arm;

computer readable program code which causes said programmable computer processor to operative if said actual moment arm exceeds said threshold moment arm, calculating a third velocity profile, wherein said third velocity profile includes a third maximum acceleration change, wherein said third maximum acceleration change is less than said second maximum acceleration change.

27. The computer program product of claim 26, further comprising:

computer readable program code which causes said programmable computer processor to calculate a plurality of first velocity datapoints $v_{(i)}$ based upon said distance, said V_{MAX}, and said a_{MAX};

computer readable program code which causes said programmable computer processor to average three or more of said first velocity datapoints $v_{(i)}$ to form each of a plurality of second averaged velocity datapoints $v_{(i)avg}$;

computer readable program code which causes said programmable computer processor to form said third velocity profile using said plurality of second averaged velocity datapoints $v_{(i)avg}$.

28. The computer program product of claim 27, further comprising computer readable program code which causes said programmable computer processor to calculate each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-N)} + V_{(i-(N-1))} \ldots + V_{(i)} \ldots + V_{(i+(N-1))} + V_{(i+(N))},$$

wherein N is greater than or equal to 2.

29. The computer program product of claim 27, further comprising computer readable program code which causes said programmable computer processor to calculate each of said plurality of second averaged velocity datapoints $v_{(i)avg}$ using the equation:

$$V_{(i)avg} = (1/(2N+1))(V_{(i-2N)} + V_{(i-(2N-1))} + V_{(i-(2N-2))} \ldots + V_{(i)}),$$

wherein N is greater than or equal to 2.

30. The computer program product of claim 6, further comprising:

computer readable program code which causes said programmable computer processor to form a first acceleration profile using said first velocity profile; and

computer readable program code which causes said programmable computer processor to form said third velocity profile by passing said first acceleration profile through a low pass nth order Butterworth filter having a cutoff frequency less than about 15 hertz, wherein n is greater than 3.